

DUODENAL ULCER.

A CLINICAL REVIEW OF FIFTY-EIGHT OPERATED CASES, WITH SOME REMARKS
ON GASTROJEJUNOSTOMY.

BY WILLIAM J. MAYO, M.D.,
OF ROCHESTER, MINN.,
Surgeon to St. Mary's Hospital.

DUODENAL ulcer has been considered a rare malady, and surgically has not received the attention its importance merits. Weir, in a masterly paper before the American Surgical Association, in May, 1900, analyzed the cases reported in literature, and with observations drawn from his own experience placed the subject on a sound foundation. Interest has been still further quickened by a number of workers, notably, Murphy and Brunner.

It has been stated that nearly all duodenal ulcers are secondary to gastric ulcers, and that the two are usually combined in the one case. This has not been entirely borne out by our experience, at least the gastric ulcer, if present, has not been of the same grade and character as the duodenal. It is of course possible that a round or fissure ulcer of the stomach might have existed without recognition from the exterior of the stomach wall.

Based on the same examination in ten out of our fifty-eight cases of duodenal ulcers, there was a separate, distinct ulcer found upon the gastric wall. In eighteen cases the pylorus was involved by a lateral extension of the duodenal ulcer, making twenty-eight out of fifty-eight, or about 50 per cent. In 100 cases of chronic gastric and duodenal ulcer recently reported by Moynihan (*ANNALS OF SURGERY*, May, 1904), twenty-two involved the duodenum, in nine the lesion was confined to the duodenum, and in thirteen, separate and distinct ulcer existed upon both gastric and duodenal walls. Up to two years ago, 11 per cent. of the gastric and duodenal ulcers which came under our care involved the duodenum, 89 per cent. the

stomach. During the past year, with more careful observation, we find 27 per cent. duodenal alone, or combined with gastric ulcer. This includes a numerous group of duodenal ulcers which extend up to and involve the pyloric ring.

We have seen a number of pyloric ulcers due to lateral extension and involvement of a gastric ulcer, and in several of these the duodenum was attacked on one margin. In others the gastric wall was involved in a duodenal ulcer, the classification of gastric or duodenal being based upon the extent of the involvement. In all of the cases of duodenal ulcer with five exceptions, the ulcerated area was easily identified as a thick, opaque spot, puckered in appearance, and usually covered by peritoneal adhesions, closely resembling the large, irregular gastric ulcer of Robson, and likewise it has been more frequent in adult males. Seymour Taylor, in this variety of gastric ulcer, found seventy-two males to twenty-eight females. In the series of fifty-eight duodenal ulcers herein reported, forty-three were in males, fifteen were in females. In two of the acute perforating cases the ulcer was clean, clear cut, and set in normal tissues; in four the perforation was through a thickened area. In the chronic cases a few completely surrounded the duodenum, in others the outlines were irregular and of various sizes and shapes, and in the smallest at least one centimetre in diameter. Most of them involved a considerable extent of intestinal wall. The five cases without any appreciable thickening are of great interest; of the two acute perforations just referred to, one gave a history of four years' chronic trouble; the second of but two weeks; no other ulceration of either stomach or duodenum could be detected. In the third there was chronic haemorrhage with acute exacerbation; the fourth case, in which gastro-enterostomy was done, died six months later from another cause, and post-mortem did not disclose macroscopic evidence, at site of previous slight thickening, of any defect in the mucous membrane; the fifth case was buried in adhesions, evidently there had been a minute perforation, which, however, could not be identified. This would seem to indicate that typical round ulcer of many years' standing

may exist without involvement of the outer coats, and therefore give little or no external evidence of disease, just as happens in the stomach. It is probable, however, that most duodenal ulcers are of the cicatricial type, and in our series there has been a relatively greater tendency to perforate than in gastric ulcer. This is shown by the peritoneal adhesions which are so often found, and by the frequency of what may be called chronic perforation, protected by a mass of adhesions to the liver, gall-bladder, or gastrohepatic omentum. These structures often form a plaster over the perforation and protect against extravasation of bowel contents. Such chronic perforations were found in ten of the fifty-eight cases. In but two patients did there appear to be more than one ulcer of the duodenum, and in one of these there was some question as to whether there was not some connection between. In two cases of supposed gall-bladder disease, which we had opened and drained on account of adhesions thought to be due to cholecystitis without stones, no relief followed, and reoperation became necessary. At this time more careful investigation revealed duodenal ulcer.

In a previous paper (*ANNALS OF SURGERY*, July, 1903), the writer referred to four cases of periduodenitis of unknown origin, operated upon for supposed gall-bladder disease, and in which the condition of the gall-bladder did not bear out the presumption. One of these cases has since been reoperated and duodenal ulcer found.

Considering the known errors and the possibilities springing from a predetermined gastro-enterostomy and imperfect examination of an ulcer situated in the pyloric region, it must be evident that duodenal ulcer is a far more common condition than has been thought. The situation of the duodenum renders it especially liable to erosion from irritating gastric secretions which the thinness of its tunics enables it to resist but feebly. Its sheltered situation fortunately enables protective adhesion in many cases, while its limited capacity and freedom from obstruction beyond prevent tension. The normal condition of relatively sterile contents, especially in the class of cases under discussion, is also a favorable circumstance.

All the cases of duodenal ulcer occurred in the first two and one-half inches of the bowel, and entirely above the entrance of the common duct, and therefore in an accessible situation. These errors should be largely eliminated, and in all doubtful cases of gall-stone disease and gastric ulcer in which duodenal ulcer is possible, the first portion of the duodenum should be inspected. For this reason, we now employ a longitudinal incision one inch to the right of the median line through the rectus muscle. This enables careful examination of the duodenum, gall-bladder, stomach, and pancreas. If more space is needed, Bevan's lateral curved prolongation of the incision at either the upper or lower end or both, gives additional access to these organs. Longitudinal incisions through the body of the muscle close well, and are more reliable against hernia than when located in the median line.

The operative indications are few. The causation and continuation of duodenal ulcer depends on the irritating gastric secretions. These must be diverted by a gastro-enterostomy. If acute perforation exists, suture of the opening and cleansing of the infected area in the peritoneal cavity combined with gastro-enterostomy, if the patient's condition warrants it, best fulfils the indications. Should there be extensive peritonitis, pelvic drainage and the nearly sitting posture (exaggerated Fowler position) should be instituted for a few days following operation. For convenience, the fifty-eight operated cases are divided into five groups: 1st, Acute perforation; 2d, Haemorrhage; 3d, Chronic ulcer with gastric complications; 4th, Chronic perforating ulcer with gall-bladder and liver complications; 5th, Chronic ulcer requiring operation for relief of pain and distress.

Group One. Acute perforation, six cases, two deaths. Acute perforating ulcer was found six times, in all but one a complication of chronic ulcer with a history of four to twenty-one years' standing. In four there was some attempt at adhesions, the acute perforation evidently occurring at a site of a partially protected area. In four of these patients there was a considerable sized opening found. In two, already referred to,

there was a clean cut perforation through what was otherwise normal bowel wall. In four suturing was easy, in two difficult and unsatisfactory, requiring gauze packing. One of these cases died from inanition from prolonged leakage, although a gastro-enterostomy was done at the same time. In the other the gauze pack was left undisturbed eleven days and rectal feeding employed for five days. The leakage was but slight and the fistula soon closed. In four the suturing held perfectly, but, unfortunately, one died from pneumonia on the tenth day. In this patient a gastro-enterostomy had also been done. The conditions were unusually favorable for an operation, which was performed within two hours of the accident, and the gastro-enterostomy was considered advisable, as it seemed certain that stenosis would follow, as it had existed previously. Superficially, this would seem to argue against gastro-enterostomy in acute perforation, but in each case the post-mortem showed the gastro-enterostomy to be perfect.

Group Two. Hæmorrhage, one case, one death. There was a single case of prolonged and repeated hæmorrhage in a chronic ulcer of three years' duration; during a two weeks' period of observation the stools showed constant evidence of blood. There was a single hæmatemesis. The ulcer was easily recognized as a little thickened patch of otherwise normal bowel wall, and was excised with pyloroplastie enlargement. The man was markedly anaemic and a poor subject for anything but a forced operation. Valuable time had been lost in attempting to build him up. Death from pneumonia occurred on the fifth day.

Group Three. Duodenal ulcer with gastric complication, twenty-eight cases, one death. Chronic ulcer with stomach complications from interference with gastric drainage was the most frequent form met with, and gastro-enterostomy was performed with recovery in each instance, excepting one in which acute obstruction of the transverse colon followed anterior gastro-enterostomy. At post-mortem a long prolapsed transverse colon was found hanging over the jejunal loop as it would

over a clothes-line. The symptoms were not acute until a few hours after death. Reoperation should have been done.

Group Four. Duodenal ulcer with gall-bladder and liver complications, eleven cases, one reoperation, no death. In this series gastro-enterostomy was performed in seven cases with successful outcome. In four cases, plastic operation was resorted to with or without excision of the ulcer. In three a modified pyloroplasty, one after the plan of Heinicke-Mikuliez with a poor result, a secondary gastro-enterostomy being required within three months, the other two after the plan of Finney and with success. In the third the duodenum, at a point two inches from the pylorus, was acutely flexed upon itself by adhesions to the liver, due to a closed adherent perforation. This made it possible to do a plastic operation upon the first portion of the duodenum without disturbing the adhesion.

Group Five. Thirteen cases, no death. In this small series only were there symptoms calling for operation which did not involve the stomach or gall-bladder, and still further emphasizes the fact that it is usually the complication which hastened operation. In practically all of these cases adhesions marked previous attacks of regional peritonitis. Gastro-enterostomy was performed in each with good results.

To recapitulate, there were fifty-nine operations in fifty-eight cases. Of these seven were for acute conditions developing, with one exception, upon chronic ulcer with three deaths. Fifty-one operations for chronic conditions gave one death. At the present time posterior gastro-enterostomy would appear to be the operation of choice in the chronic cases, but the last word has not yet been said. The time elapsed since operation in the majority of the cases herein reported suggests the possibility of further sequelæ, particularly in those cases in which there is no obstruction, and in which experience has taught us that at least partial closure of the gastro-enterostomy opening may take place. It is pretty certain that even with a large gastro-enterostomy the food will pass out by preference through an unobstructed pylorus by muscular action, the apparent grav-

ity advantage of a low-point gastro-enterostomy being equalized by intra-abdominal tension. Gastro-enterostomy performed for gastric ulcer is open to the same objection if there be no stenosis. For this reason, when the ulcer does not cause at least partial obstruction, it may be necessary to artificially block the pyloric outlet.

An occasional complication following gastro-enterostomy is bile regurgitation into the stomach. Acute vicious circle will seldom be seen if the opening be made at the bottom of the gastric cavity. We had but one case in 316 gastrojejunostomies (excluding our first fourteen cases), and that one in a patient eighty years old. Chronic bile regurgitation is a more frequent condition, beginning, as Ochsner points out, within three months, if at all, although it may be a year or more before it gets troublesome.

Carle and Fantino have shown that a little bile is to be found in the stomach at times in nearly all cases after gastrojejunostomy, and state that it does no harm. We have had a number of patients complain bitterly of the distress occasioned. As a rule, the food passes out quickly, but there will be attacks of biliary regurgitation at intervals of days or weeks. We have observed this phenomenon after the various methods of operation, and have been compelled to reoperate a number of times to check the disturbance. If the patient is in good general condition, we now perform a posterior suture gastro-entero-stomy with a nine- or ten-inch loop, after the clamp method introduced into this country by Moynihan (*Transactions of American Surgical Association*, 1903). Four inches below the completed gastro-enterostomy an entero-anastomosis with suture between the two limbs of the bowel is made, using the holding clamps. This adds ten minutes to the operation. A medium Murphy button is preferred by many surgeons for making the entero-anastomosis. To do this, the intestinal clamp is removed after the two posterior rows of sutures are introduced in the gastro-enterostomy and half the button passed down inside each limb through the incised jejunum to a point previously marked with the knife. The intestine is nicked, and the proper

WJ Mayo.

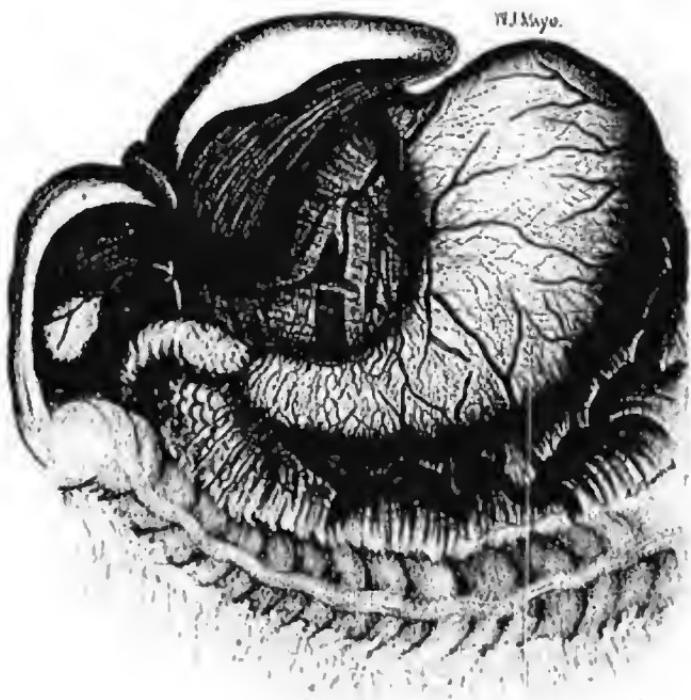


FIG. 1.—Ulcer of duodenum. Pylorus blocked by infolding method *A*. Sutures in place but not tied. Methods *B* and *C* at point marked XX.

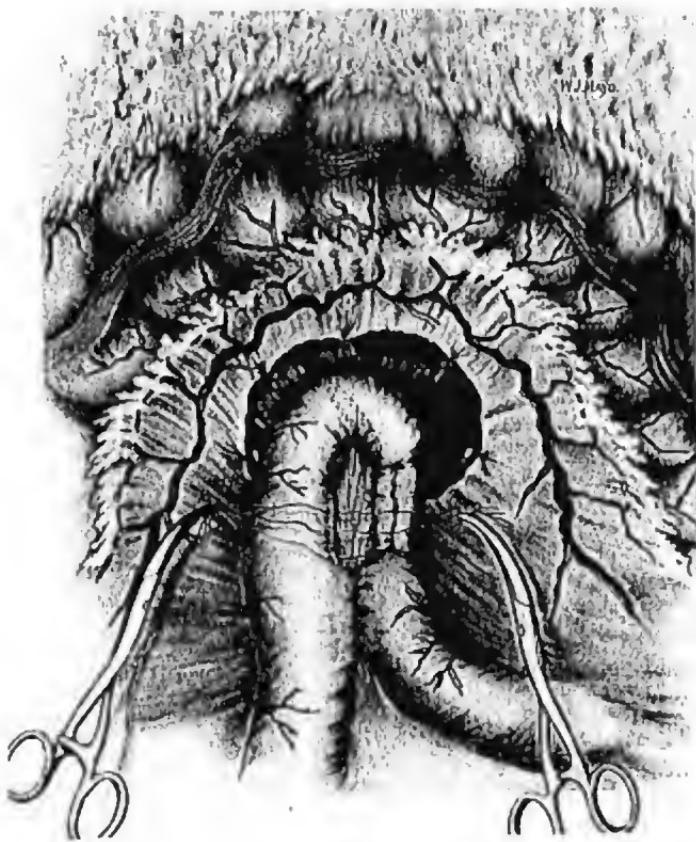


FIG. 2.—Posterior gastro-enterostomy with entero-anastomosis and infolding; sutures placed for obliterating intestinal interspace. X marks site of silver-wire constriction or complete division. Note that the drawing shows stomach and colon drawn outward and upward as in actual operation. Replacement of viscera reverses position and brings intestinal opening at the bottom of gastric cavity.

part of the button forced through and junture made without a puckering suture (Weir). This adds about three minutes to the time.

A few mattress sutures should be placed as a protection about the button if it is employed. The only patient we lost in the last sixty-one gastro-enterostomies at St. Mary's Hospital was one in which the button union gave way suddenly on the sixth day, the patient having not a bad symptom up to that time. Secondary laparotomy was performed ten hours later, but the patient died. After completing the button enterostomosis, the gastro-enterostomy is finished in the usual manner, and the opened mesocolon attached to the posterior wall of the stomach in several places.

To prevent bile arising to the level of the stomach and also to cause the food to always pass out the efferent bowel, the afferent intestine between the entero-anastomosis and the gastro-enterostomy should be closed in one of three ways. Method (a). Infolding may be practised after the plan of Scott-Mattoni, a continuous linen or silk suture an inch and a half in length turns the periphery of the intestine into the lumen. (Fig. 2.) Method (b). Fowler accomplishes the same result by passing a No. 20 silver wire twice about the afferent loop at point X (Fig. 2), and twisting tight enough to obstruct without injury to the circulation, the twisted ends of the wire being turned closely into the wire loop (*Transactions of American Surgical Association*, 1902). Methods (a) and (b) prolong the operation about three minutes. Method (c). We have in some secondary operations completely divided the afferent intestine at point X (Fig. 2), closing both intestinal ends by a circular suture (Doyen), making the separation absolute; operation prolonged five to eight minutes. In all cases the open space between the two limbs of the intestinal loop should be partially closed by a few sutures at its lower part to prevent a coil of bowel herniating into the opening (Fig. 2).

A comparison shows the infolding method to be the easiest, but Crile had a case in which, after a time, the infolded intestine straightened out and required another operation. The Fowler

method is evidently more certain. The Doyen operation is of course sure, but takes a little more time and adds somewhat to the gravity of the procedure. When finished, however, it has all the advantages of the "Y" operation of Roux.

Closure of the pylorus to divert all the food to the gastro-enterostomy is under consideration, and probably should be done in the large majority of cases if there is no cicatricial obstruction. The three methods already described for closure of the afferent intestine apply equally to the pylorus. The in-folding method is shown in Fig. 1. The point for the application of the Fowler loop or complete division is shown by X (Fig. 1). We have either infolded or divided for the purpose of obstructing the pylorus. Ochsner has used the wire loop a number of times successfully for this purpose.

The entire time of the combined operation should not exceed thirty-five to fifty minutes, according to the method chosen, and including opening and closing the abdomen. In view of the fact that gastro-enterostomy is no longer a last resort, but an operation of choice to promote comfort and relieve disability, we must not only give a low mortality rate, but also a high percentage of permanent cures.

The cases above reported were operated upon in St. Mary's Hospital by Dr. Charles H. Mayo or the author.